

Summary of Soil Particle Size Publications and EPA Guidance Relevant To:  
Soil Exposure, Dermal Adherence, Soil Ingestion, Enrichment, and Bioavailability

Study	Type of Study	Materials Used	Adult Child	Particle Size Adhered microns (µM)	Notes
(Kissel, Richter <i>et al.</i> , 1996)	hand press	fractionated 5 native soils less than 150; 150-250; >250	Adult	Dry (<2%) less than 250 Wet (12-18 %) > 250	Adherence varied with moisture Moisture reduces relative importance of < 65
(Que Hee, Peace <i>et al.</i> , 1985)	hand press petri dish	fractionated house dust: < 44; 44-149; 149-177; 177-246; 246-392; 392-833	Adult Child	less than 246 adhered equally well	
(Duggan, Inskip <i>et al.</i> , 1985)	London (urban) School yard	Field study London dusts	Child 5-6 years	mostly less than 10 maximum 100	sampled children before or after hand wash correlated < 500 µM dust Pb to Hand Pb to Blood
(Driver, Konz <i>et al.</i> , 1989)	hand press petri dish	5 dried fractionated soils less than 150 and < 250 and bulk	Adult	All size fractions adhered Ranked Order: < 150; < 250, Bulk	adherence varied inversely with particle size adherence included 250 µM and greater
(Duggan & Inskip, 1985)	dust rubbed onto fingers			Recommends sampling less than 200 Need to standardize size sampled	paper review health significance of childhood exposures to dust
(Hogan, Marcus <i>et al.</i> , 1998)	Midvale NPL	Soil and House Dust	Children	Sampled less than 250	IEUBK: empirical comparisons with epidemiologic data
(Sheppard & Evenden, 1994)	hand press adhesive tape	11 soils whole soils varied moisture content	Adult	selective for dry particles less than 50 < 2 adhered, but not ingested < 2 most relevant to dermal route	enrichment increases inversely with: 1) particle size 2) loading Size for ingestion likely between 2 and 100
(Succop, Bornschein <i>et al.</i> , 1998)		Quantitative empirical meta-analysis 11 lead sites by U Cinn	Child N = 1855	Sampled less than 250	multi-media lead exposure analysis correlated < 250 µM soil to dust to hand to blood
(U.S. EPA Technical Review Workgroup for Lead, 2000)	EPA Sieve Guidance	Guidance	-	Upper limit of 250	will publish on TRW Web Site <a href="http://www.epa.gov/superfund/programs/lead/prods.htm#short">http://www.epa.gov/superfund/programs/lead/prods.htm#short</a>
(U.S. EPA Technical Review Workgroup for Lead, 1999)	EPA Bioavailability Guidance	Guidance	-	Relevant bioavailability studies use soil of less than 250	
(Casteel, Cowart <i>et al.</i> , 1997)	Swine Bioavailability	Bioavailability	Swine	Fed less than 250 soil	Juvenile swine are preferred animal model for estimating bioavailability of lead in children
(Maddaloni, Lolacono <i>et al.</i> , 1998)	Adult Bioavailability	Bioavailability	Adults	Fed less than 250 soil	
(Stanek, Calabrese <i>et al.</i> , 1999)	Tracer Soil Ingestion	Compared soil IR estimates: < 2000; < 250, 100-250; 53-100	Child	Anaconda, MT Study	Supports soil ingestion of < 250 instead of 2 mm no conc. difference between 100-250 and 53-100
(Calabrese, Stanek <i>et al.</i> , 1996)	Tracer Soil Ingestion	Compared soil IR estimates: less than 2000 versus < 250	Child	Anaconda, MT Re-analysis	Supports soil ingestion of less than 250
(Davis, Waller <i>et al.</i> , 1990)	Tracer Soil Ingestion	Residential Soil IR	Child	Sampled less than 250 Southeastern Washington State	
(van Wijnen, Clausing <i>et al.</i> , 1990)	Tracer Soil Ingestion	Camping Soil IR	Child	Sampled less than 2000 µM Children camping by lake	Netherlands

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